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ERTS PROGRESS REPORT

FOR THE PERIOD 1 JUNE TO 31 JULY, 1974

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TMX-70182

PLANNING APPLICATIONS IN EAST CENTRAL FLORIDA

PROPOSAL NO. Y-10-066-001

BREVARD COUNTY PLANNING DEPARTMENT

1196A

ERTS PROGRESS REPORT

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PLANNING APPLICATIONS IN EAST CENTRAL FLORIDA

PROPOSAL NO. Y-10-066-001

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N74-33822

Unclas 00754

* Brevard County Planning Department

** NASA, Kennedy Space Center

FLOOD PLAINS

A problem of current concern to local and regional planners is that of delimiting flood plains. This problem is of concern for two reasons: (1) In regions experiencing rapid population growth, there is increasing pressure for development of undeveloped land. (2) Federal flood insurance regulations require that local governments know the location of the 1/100 annual flood probability line.

Some progress on this problem for the Mississippi River basin using ERTS data has been reported by Rango and Anderson.[1]

A related phenomenon has been observed on ERTS images of the St. Johns River Basin in our area. It has been noted that band 7 images show a moderately-to well-defined gray area in the vicinity of the river. In some sectors, this gray sector is difficult to delineate; in others it is quite sharply defined.

The St. Johns is unusual in that it lies on a flat region with large marsh areas and relatively few trees, at least in this section of the basin. Aerial photography and satellite images give a relatively unobstructed view of the basin except in some places where a canopy of willow and other trees obscures the river and its immediate ground environs.

The sector of the river studied for this purpose is that running along the western edge of Brevard County, where the river approximates the western boundary of the county. Figures 1 to 3 show the southern, central, and northern sectors, respectively, with some overlap. These are enlargements of band 7 images (for different dates) enhanced to bring out this effect. The river runs from south to north. Figure 1 shows

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[1] Albert Rango and A. T. Anderson
ERTS 1 Flood Hazard Studies in the Mississippi River Basin
report No. X-650-73-294, Goddard Space Flight Center

Figure 1

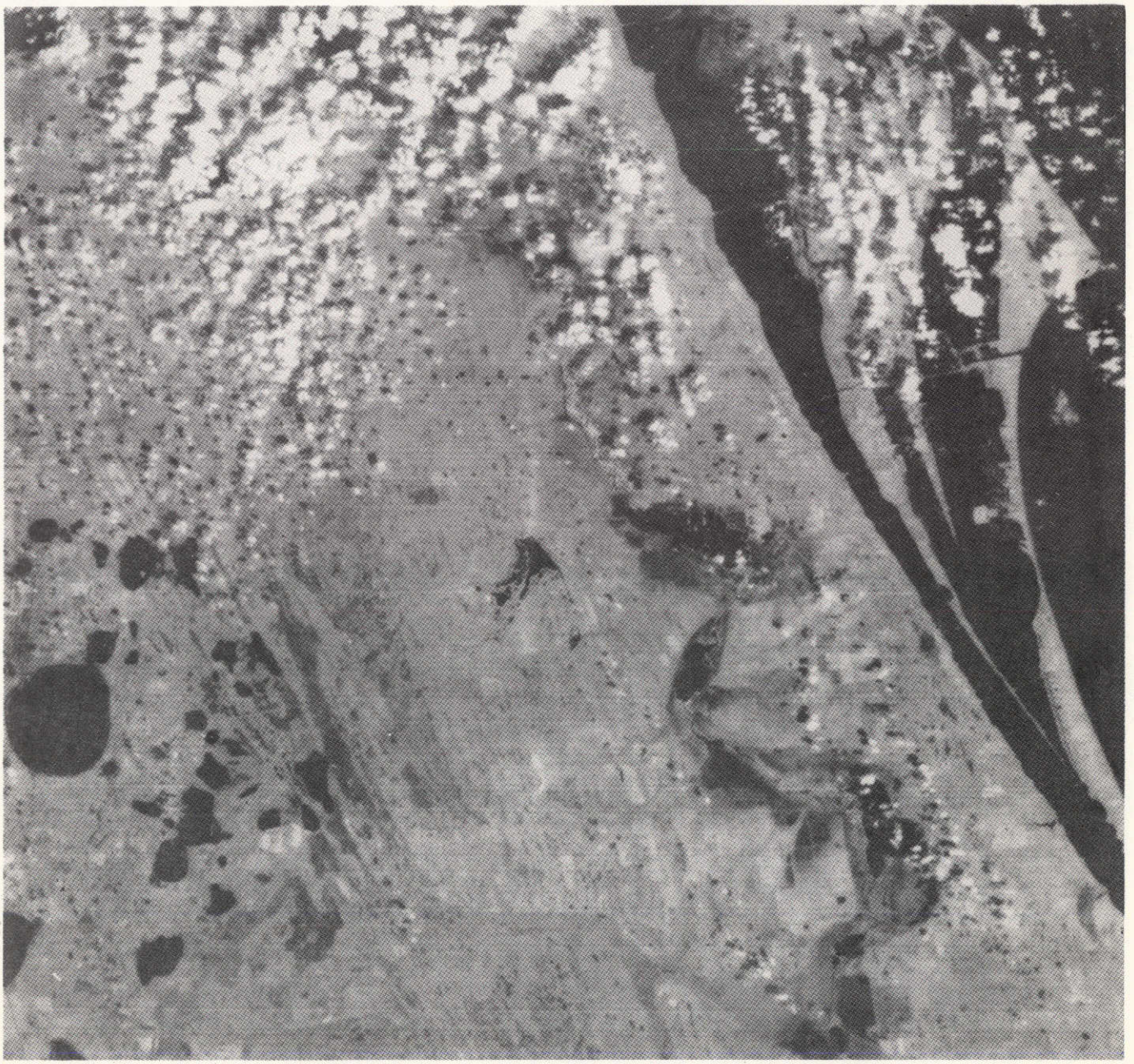

Figure 2

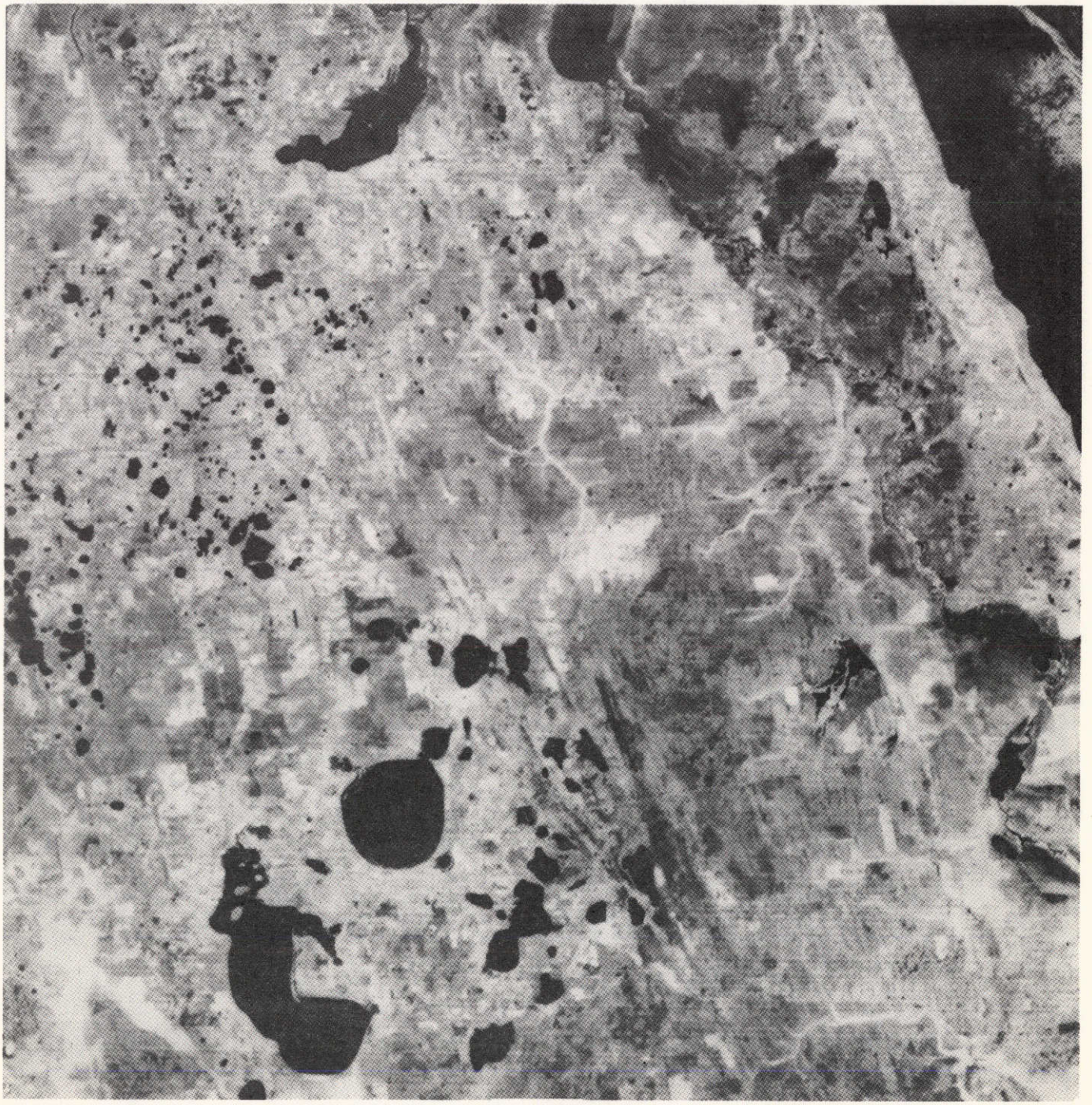

Figure 3

the origin of the river; it also shows the effect of drainage of the marsh, which formerly occupied an appreciably larger area than it does now. The light-colored, rectangular sectors are drained sectors, mostly converted to pasture. Much of the drainage water is carried by ditches eastward to the Indian River. Lake Washington, located approximately one inch from the top of Figure 1, is the major source for the water supply of the southern portion of the county, which now has a population of 107,500, projected at 245,000 in 1995. Water supply is generally regarded as the limiting factor on population growth in this part of the county.

Several sources of information have been used to obtain evidence leading toward an interpretation of the gray area: color infrared aerial photography, panchromatic aerial photography, discussions with persons familiar with the river basin, comparison with known marsh regions in the Merritt Island Wildlife Refuge; comparison with ERTS images of coastal wetlands; comparison with topographic maps, and walking selected sectors.

The evidence from these sources has led us to the conclusion that the gray area in these images represents marsh and semi-marsh. Where we have checked it, this conclusion is consistent with results obtained from a maximum likelihood program which currently is in the testing stage.

The appearance on the image is similar to that of coastal wetlands areas on ERTS images of other regions, e.g., the west coast of Florida.

Color infrared and panchromatic aerial photographs show a vegetation and soil moisture pattern which corresponds approximately to the subject pattern.

The most persuasive argument is presented by comparing the ERTS pattern to topographic maps, where a general correspondence is seen between the gray ERTS area and the marsh area shown on the topographic maps (making allowance for the fact that the topographic maps are somewhat outdated and some of the marsh shown thereon has been removed by drainage).

The boundary of the gray area varies somewhat with the amount of rainfall. In most places, the variations are small; an exception is the wide gray area in the top half of Figure 3, for which the changes are significant. This area was abnormally wet at the time of the pass shown in Figure 3.

A band 7 density-sliced computer map shows the pattern in useful detail (an approximate scale of 1/24,000 on the original map). Photographic reproductions of this map are shown in Figures 4 to 7, which represent south-to-north sectors, respectively, with overlap at one interface. The map shows water surface as dark, the subject area-marsh and semi marsh - as gray, and everything else blank. Major highways (obtained from a band five map) and the county line have been drawn in. The water surface running along the eastern edge of the figures is the Indian River. We feel that in the original scale of 1/24,000, maps of this type represent sufficiently accurate and detailed maps of marsh areas to be useful for planning purposes, and these have been used in providing information for development of a land use plan for the mainland portion of the county. These data were taken on September 6, 1972, which is during the wet season.

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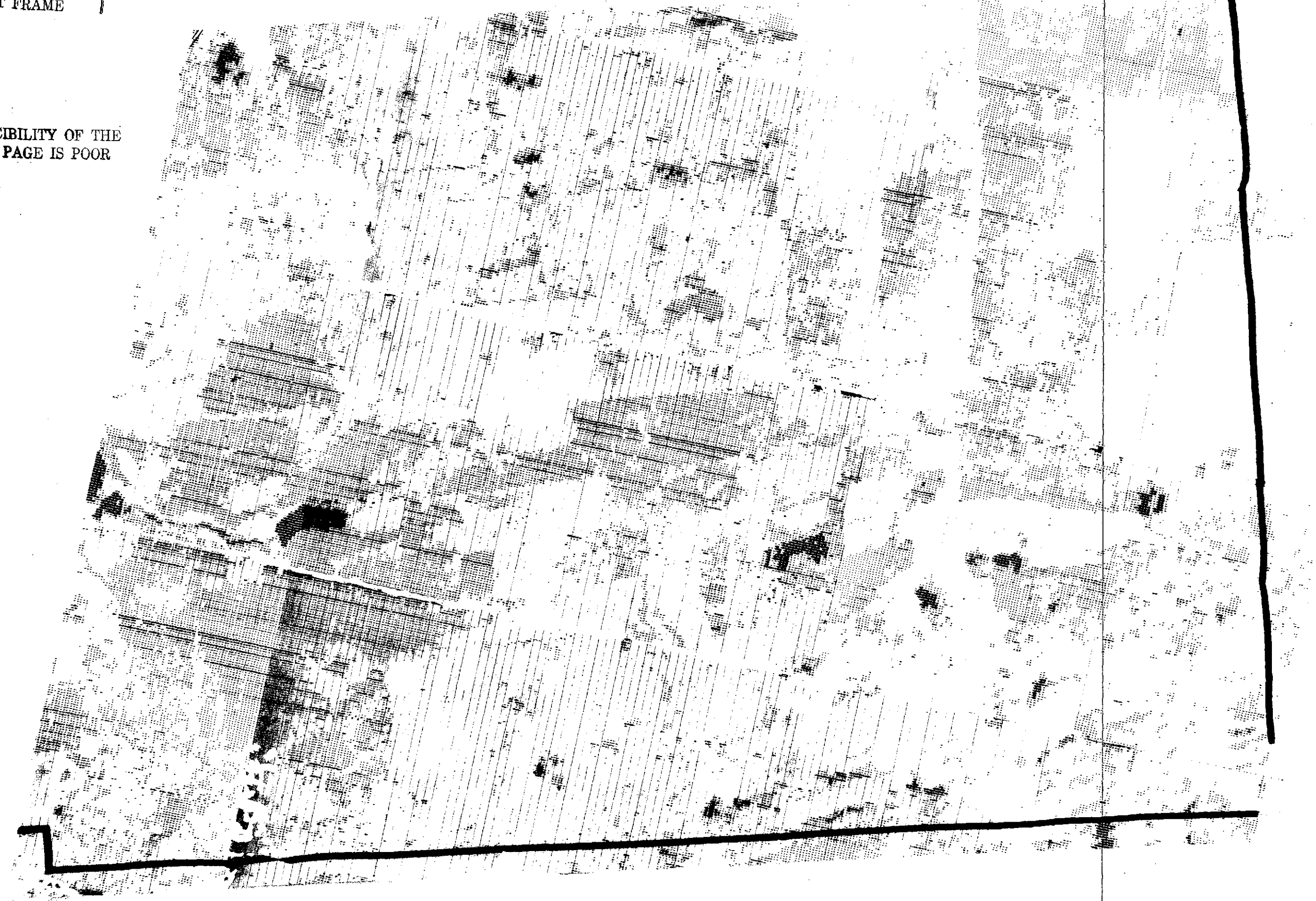

Figure 4
-7-

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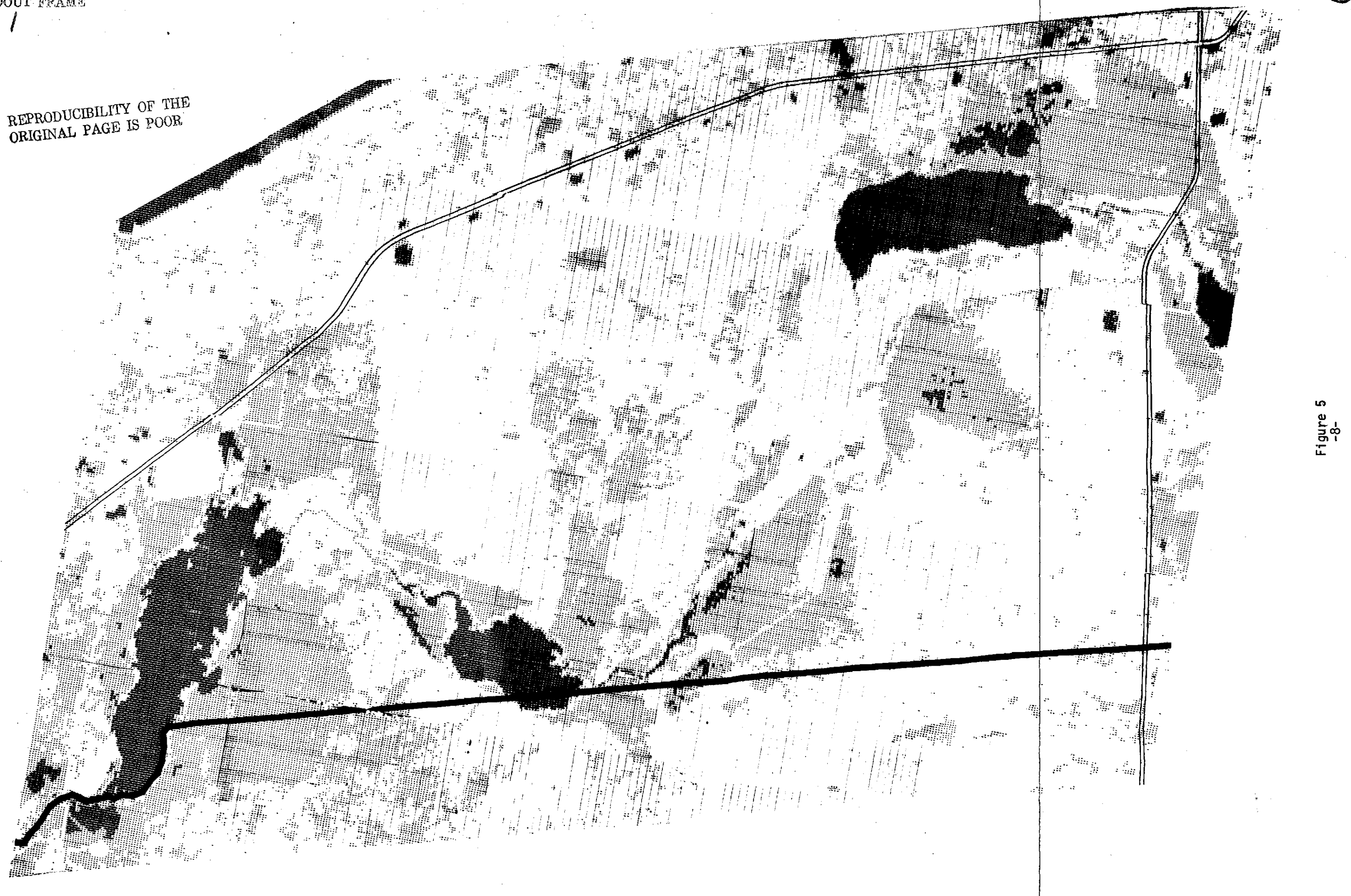

Figure 5

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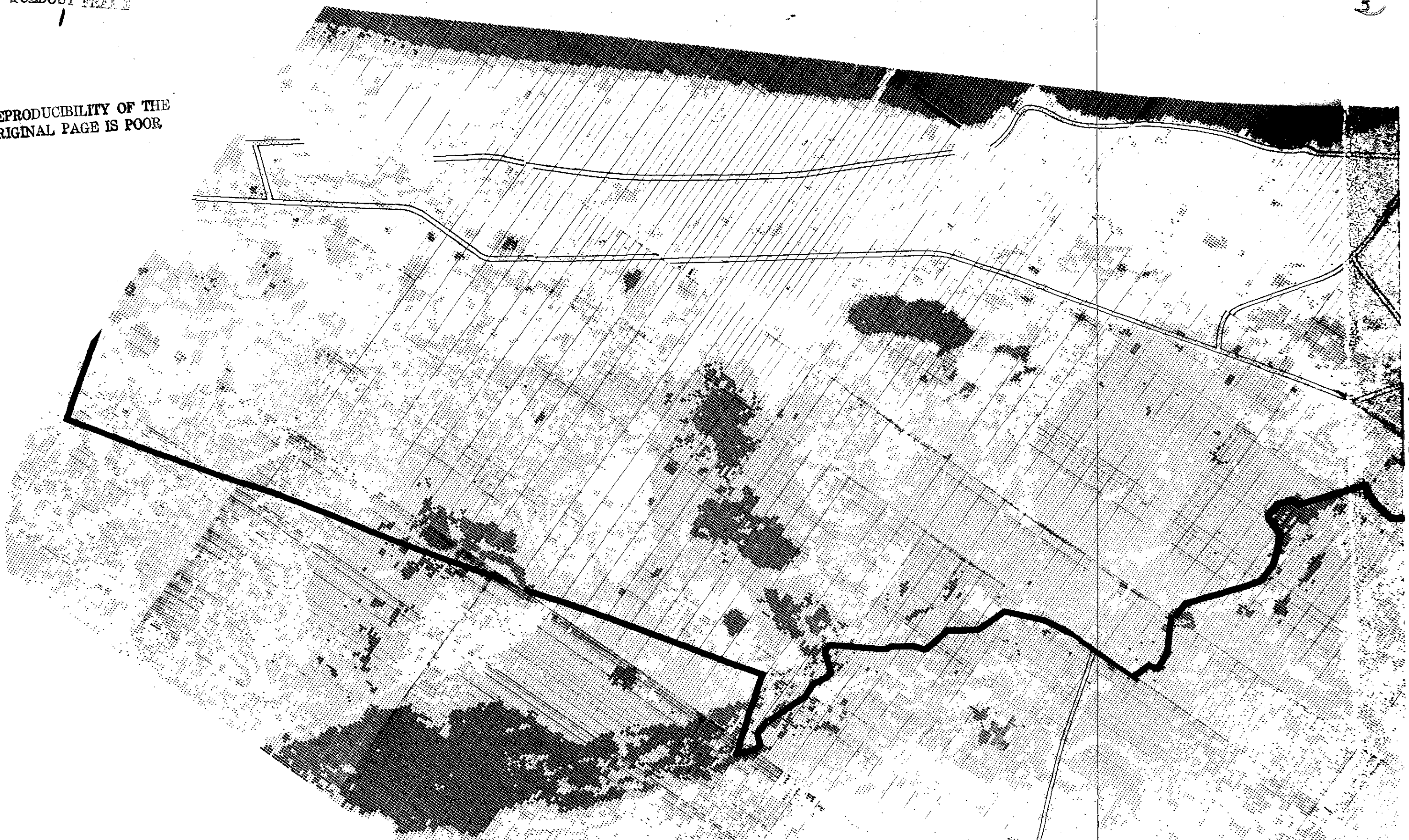

Figure 6
-9-

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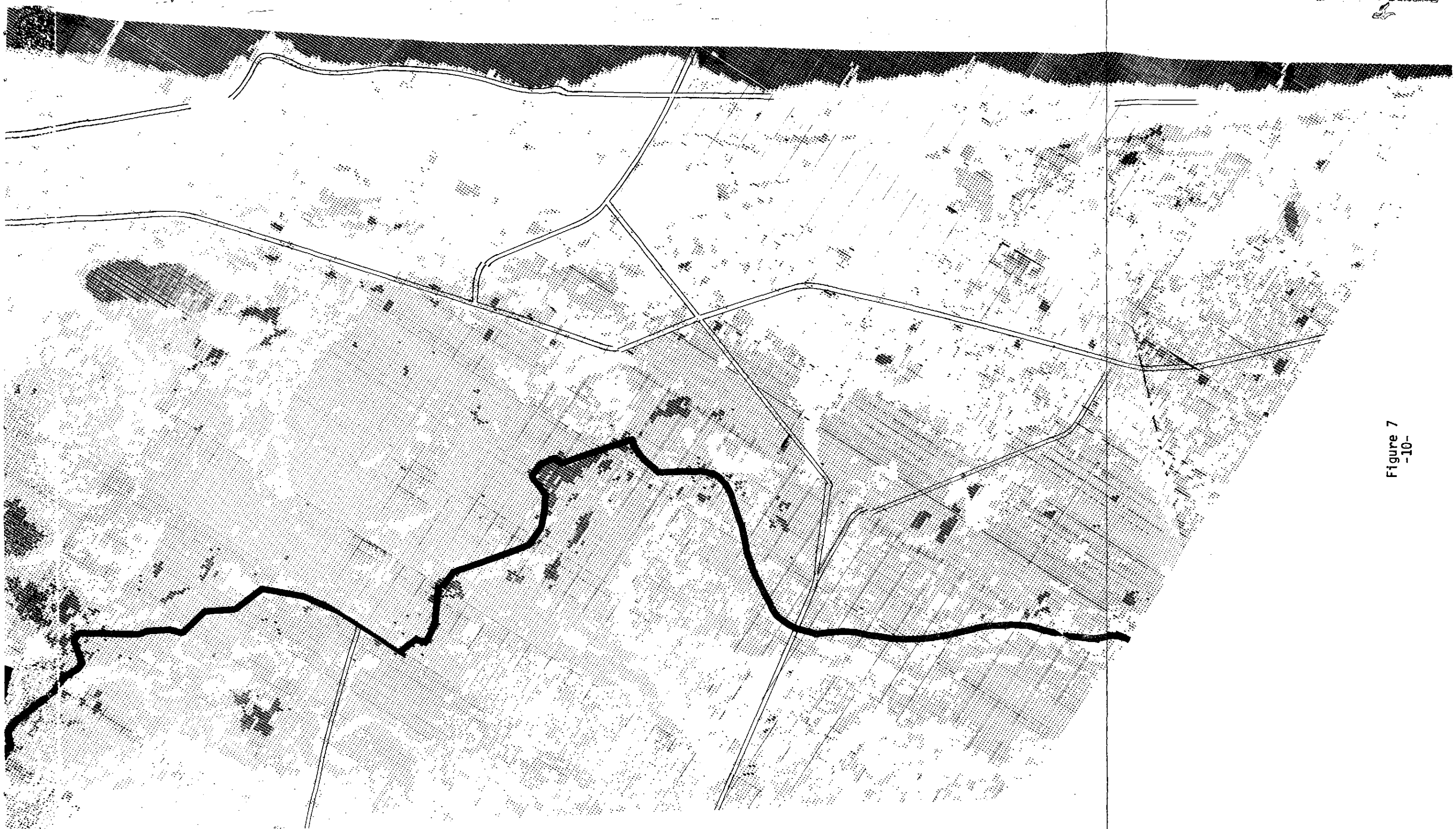

Figure 7
-10-

Again, it will be noted that many dikes are seen clearly. Study of this map indicates which dikes are accomplishing their intended purpose and which are not.

Another way to present this result is shown in Figure 8, which is an image made by scanning, quantizing, and enlarging the ERTS band 7 image, using an Optronics International drum-type microdensitometer. As in the computer map, black represents visible water and gray represents marsh and semi-marsh. In this particular case, both the black and gray areas are slightly smaller than they should be. This error is not inherent in the method, but can be corrected by a slight adjustment of the gray scale parameters used to make the image. Since both this method and the computer density-sliced mapping method are quantizing methods, they require proper setting of gray scale parameters to obtain the proper image; but this can be done readily by referring to the ERTS band 7 image, which shows relatively continuous density variation. The gray scale parameters are adjusted to match the gray pattern in the ERTS band 7 image.

One method of investigating the meaning of the gray area on the band 7 images was to observe the pattern in the Merritt Island Wildlife Refuge, where the marsh pattern is well known. Figure 9 shows the result of projecting three different ERTS Band 7 images on a map of the wildlife refuge and tracing the outline of the gray area. Where the three gray areas did not coincide, separate lines are seen. The cross-hatched lines on the map represent dikes built for mosquito control purposes. The gray area is a good approximation to the impoundment areas built for mosquito control and containing vegetation in water, i.e., marsh.

Figure 8

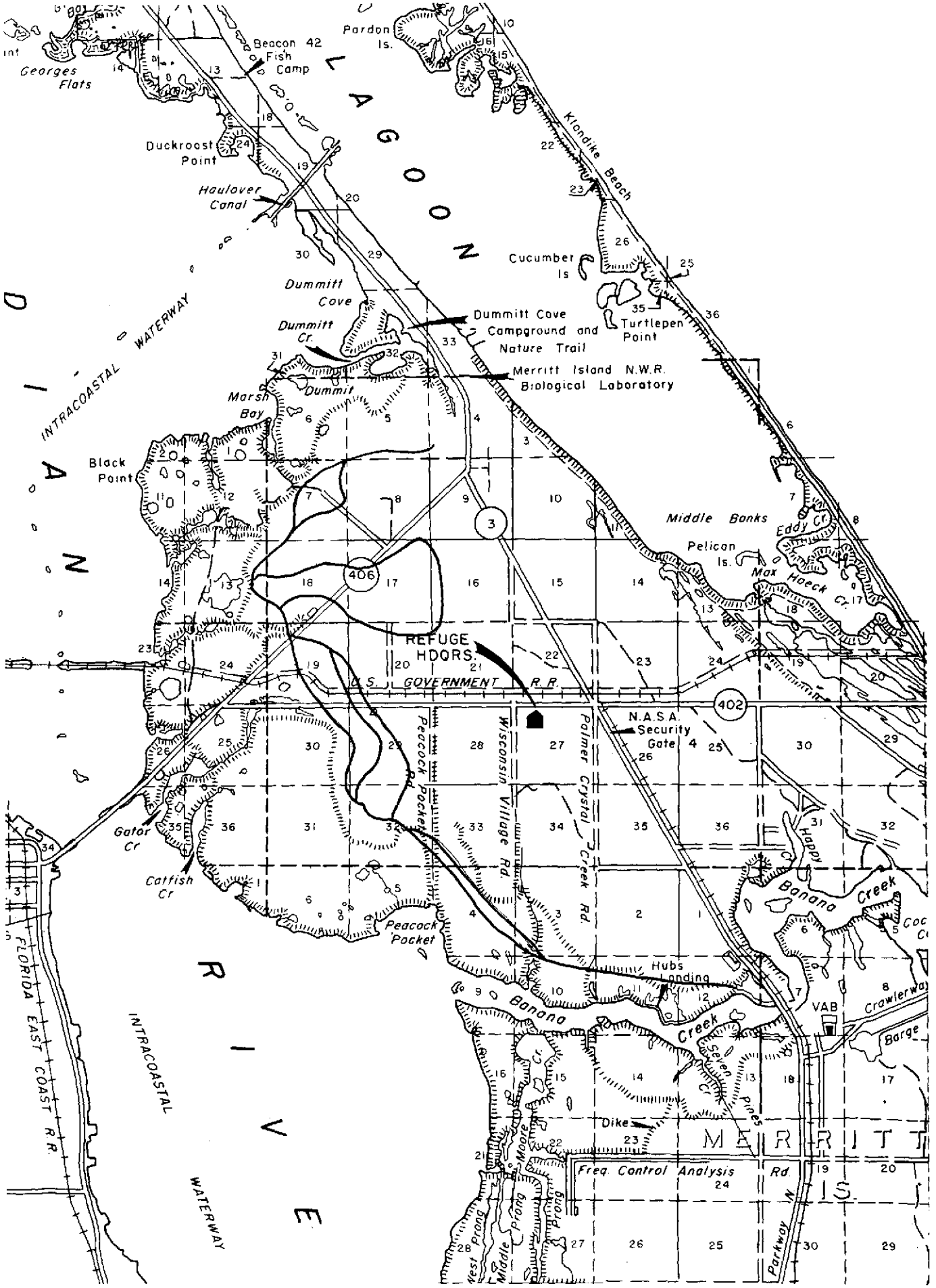
INDIAN RIVER LAGOON
INTRACOASTAL WATERWAY
INTRACOASTAL WATERWAY
FLORIDA EAST COAST R.R.
Georges Flats
Beacon 42
Fish Camp
Pardon Is.
Duckroost Point
Haulover Canal
Klondike Beach
Cucumber Is
Turtlepen Point
Dummitt Cove
Dummitt Cr.
Dummitt Cove Campground and Nature Trail
Merritt Island N.W.R. Biological Laboratory
Marsh Bay
Black Point
Middle Banks
Eddy Cr.
Pelican Is.
Max Hoeck Cr.
REFUGE HDQRS.
U.S. GOVERNMENT R.R.
N.A.S.A. Security Gate 4
Wisconsin Village Rd.
Palmer Crystal Creek Rd.
Peacock Pocket
Gator Cr
Catfish Cr
Happy Banana Creek
Hubs Landing
VAB
Crawlerway
Barge
Seven Pines Cr
Dike
Freq. Control Analysis Rd
MERRITT ISLAND
Parkway
West Prong
Middle Prong
Moore Prong
406
402

Figure 9
-13-

FOLDOUT FRAME 1

FOLDOUT FRAME 2

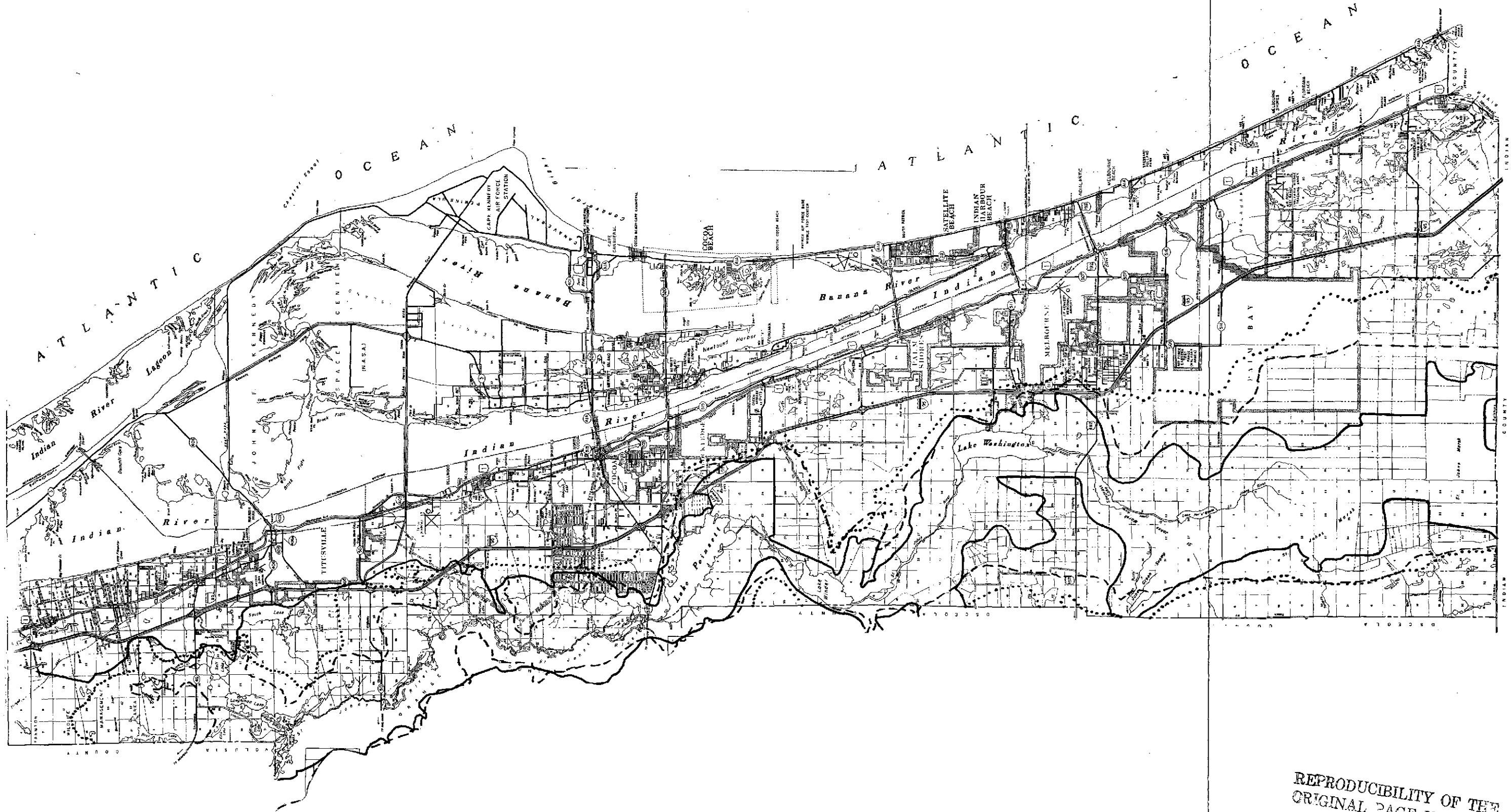

Figure 10
-14-

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Figure 10 shows the relations between three different lines having significance with regard to the St. Johns flood plain. The solid line represents a tracing of the boundary of the gray areas of Figures 1 to 3 as projected on a map by means of a Bausch and Lomb Zoom Transfer Scope. The dashed line delimits the flooded area (at least 30 day duration) of a 1953 flood as drawn by the U. S. Army Corps of Engineers. The dotted line represents a generalization of the 1/100 annual flood probability line as developed by the U. S. Geological Survey. Since the ERTS marsh line generally falls inside the other two lines, it does not change any conclusions but does provide further information. In a couple of spots, however, the ERTS marsh line lies outside the other two lines; those spots should be investigated further. These three lines have been used as background information by Brevard County planners in arriving at recommendations regarding areas which should be regarded as developable and areas which should be preserved in an undeveloped state. Those recommendations are contained in a new land use plan now under consideration by the County Commission.

One advantage of the ERTS marsh line map is the repetitive nature of its availability, making possible the observation of seasonal effects and determining areas which are flooded or marsh part of the time.

ACKNOWLEDGEMENT

Brett Horsley, Brevard County environmental planner, helped prepare Figure 10 and contributed to interpretation of these results, as did David Cox of the Florida Game and Fresh Water Fish Commission. Robert Yoder, of the U. S. Fish and Wildlife Service, provided information about the Merritt Island Wildlife Refuge and a map. Robert Butterfield, of the Kennedy Space Center Earth Resources Data Analysis Facility, prepared Figure 8. The Photographic Laboratory at KSC prepared Figures 1-7.